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The Development of Students Worksheets Based on Local Wisdom in Substances and Their Characteristics in Junior High School

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Abstract. This study aimed to develop Students Worksheets (LKPD) based on the local wisdom of matter substances and their characteristics in order to improve the character of junior high school students. The development research design used was the ADDIE model which consists of 5 stages, namely analysis, design, development, implementation, and evaluation. The instruments used in the study were validation sheets, observation sheets, response questionnaires, and self-assessment questionnaires about characters. The results of the study concluded that LKPD based on local wisdom was appropriate to be used in science learning, included in the practical category so as to make it easier for students to learn, and effectively develop students' character.

Keywords: LKPD, Local Wisdom, Character; Students Worksheets Based; Substances and Their Characteristics.

INTRODUCTION

The 2013 curriculum requires that learning carried out by educators be linked to facts or actual events. Educators can take advantage of various learning resources that are packaged from various facts or problems that exist around students. Objects related to the content of subject matter are confronted directly with students so that students know what is learned. According to Mumpuni (2013) that learning material that is associated with problems that occur in the environment of students will help students in understanding the problems that exist, thus making it easier for students to solve problems in the community. The 2013 curriculum also emphasizes curriculum decentralization, so educators can be creative in developing learning resources that are available according to learning materials.

Student Worksheet (LKPD) is one of the learning resources that can be developed by educators. The results of observations at Sungai Kakap Middle School found that learning resources, especially LKPD, which were used lacked training in scientific activities of students. Students only do the questions. Educators have not yet developed LKPD themselves. LKPD that are used in schools tend to contain questions that have to be done by students, without inviting students to investigate the concepts learned (Sari, E., Syamsurizal, 2016).

Science learning can not be separated from the activities of investigation and discovery, because science from observations of natural phenomena or events that occur in nature and are very close to life. To encourage students to carry

out investigations, educators can use students' world views to integrate local and western knowledge (Lee, Yen and Aikenhead, 2012).

In science learning, students must be actively involved in the process of inquiry to find their concepts learned so that students' understanding will increase (Damayanti, 2015). Events that occur in the local community or culture that are still applied in life can be a source of learning in learning science. In the culture of the community contained basic concepts that can be used in solving environmental problems.

The culture of the local community is called local wisdom. Culture as a part of local wisdom is defined as a set of beliefs adopted by a certain group of people in a certain area which is still fully believed and upheld (Eko and Putranto, 2019). Local wisdom is a strategy in managing natural resources to deal with humans and maintain an environmental balance that has been tested by events in nature (Fahrianoor *et al.*, 2013). Thus local wisdom can be integrated into science learning because a lot of knowledge can be drawn from the habits and daily activities that develop in local communities that can be implemented in learning science for use in solving problems in society (Hairida, H., & Junanto, 2018).

Local wisdom is related to national identity because people's habits or behavior contain elements of life that are commonly applied by the community and are still used by the community itself. The community manages natural resources to sustain their lives through local knowledge and social processes in their environment. Local wisdom is related to the balance of life with nature, knowledge, skills, intelligence, wealth, and life of local communities, as well as unwritten rules (Mungmachon, 2012; Khusniati, 2014). Local wisdom can be built from local potential (excellence) developed from various aspects of life, for example, aspects of wealth and natural conditions, human capabilities and culture, and history (Prasetyo, 2013). So local wisdom is ideas, habits, daily activities, culture, geography, basic knowledge, and local superiority that develops in a local community in maintaining the balance of nature.

The formation of character and noble character of students can be achieved through the implementation of the values of local wisdom in character education (Chairiyah, 2018). The development of children's characteristics in the world of education and society can be done through character education (Susilo and Irwansyah, 2019). In local wisdom contained noble values of the Indonesian nation that can be introduced to students in science learning for the character building of students. Local wisdom in the science curriculum can strengthen students' nationalism (Kidman, Yen and Abrams, 2013).

Implementation of local wisdom or local potential is very important and relevant in learning science (Winaryati, 2012). However, local wisdom in the learning process, especially science, is very rare or even never implemented (Hairida, 2017; Safitri and Wahyuni, 2018). In line with the results of the study from (Parmin *et al.*, 2016) it was found that science teachers did not integrate local wisdom in their learning plans. This is also shown from the results of a preliminary study on educators in SMP Kakap Subdistrict, Kubu Raya Regency, found that local wisdom is rarely implemented in science learning. Students tend to be less concerned about the environment, collaboration between students is difficult to carry out in the class, and less responsible for the tasks given.

The Kubu Raya district's peatlands are 523,400 or 76 percent of the total land in the Kubu Raya district. The peatlands contained in local wisdom which is very potential to be a source of learning, for example, local community activities in making palm sugar from palm juice, traditional copra processing, processing of cassava into tapai and crackers, planting rice in the fields, can be used as a source of learning in science for developing student character. However, these learning resources have not been utilized by educators in Kubu Raya Regency as learning resources. Cooperation and care for the environment carried out by the local community in protecting and processing natural resources can be emulated by students.

Teachers can develop learning source by integrating local wisdom, such as LKPD. Through the development of LKPD, it is hoped that students will not forget the values of local wisdom of the community. Local wisdom needs to be preserved because the values of local wisdom have begun to be forgotten, not much talked about, and are not introduced anymore to students, and in daily life, they do not appear today (Wagiran, 2012). The Kubu Raya district peatland area is a potential theme raised in LKPD for the character building of students because daily activities or community habits in the peatland contain life values that can be implemented in LKPD. For this reason, it is very

urgent to research the development of LKPD based on local wisdom to improve the character of students.

This study aimed to develop LKPD based on the local wisdom of substances and their characteristics in SMP Kubu Raya in order to develop the character of students. Through this research, it is expected that LKPD based on the local wisdom of the community in peatlands, the substance and its characteristics are suitable for educators in science learning in Kubu Raya. LKPD is also expected to provide convenience for students in learning Natural Sciences. In addition, the results of this study can be an alternative reference for educators in introducing the cultural values of the local community to develop the character of collaboration, curiosity, responsibility and care for the environment of students.

METHOD

Product development in research used the ADDIE model (Branch, 2009). This model consists of 5 (five) stages of activities, namely, analysis (analysis), design (design), development implementation, and evaluation. Each stage of the model was developed by researchers into the following research procedures

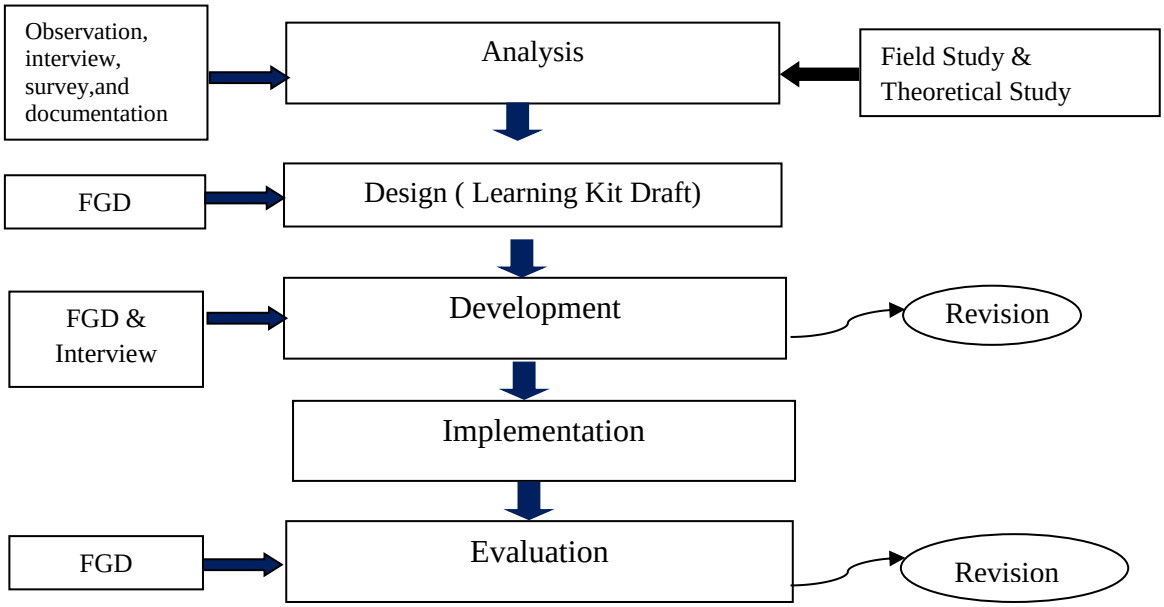

Figure 1. Procedure of LKPD Development Based on Local Wisdom

The subject of this research is LKPD based on the local wisdom of the people in the peatland area of Kubu Raya district, which was tested on a limited and extensive basis. Taking research subjects for testing using purposive sampling technique in class VII students of SMPN 1 Kakap District as many as 10 people for limited tests and 20 people for widespread testing. Data collection was carried out using the instrument of validation of the suitability of local wisdom, the concept of Natural Sciences, and characters with the Basic Competence of Natural Sciences, LKPD eligibility validation sheets, observation sheets, interview guidelines, LKPD practicality test questionnaire, and self-assessment questionnaire about characters.

The concepts of science and character found in local community wisdom and products developed in the form of LKPD are validated to determine their validity to be suitable for use in learning. The results of the validation were analyzed using the adoption of the validation criteria according to (Widoyoko, 2016).

Table 1. Validation Criteria

Score Range	Category
X > 3.40	Very Good
2.80 < X ≤ 3.40	Good
2.20 < X ≤ 2.80	Medium
1.60 < X ≤ 2.20	Poor
X ≤ 1.60	Very Poor

Questionnaire responses to LKPD were analyzed using the formula:
Score Percentage (V) = $\frac{\text{score obtained}}{\text{maximum score}}$x 100%, with criteria:

Table 2. Score Criteria

V (%)	Category
77 - 100	Very Good
51 – 75	Good
26 – 50	Fair
≤ 25	Poor

(Sari, E., Syamsurizal, 2016)

In the analysis phase, a needs analysis is carried out, both from the field (schools and Kubu Raya district communities) and theoretical studies. Analysis of the needs from the area in the form of gathering information about learning resources that need to be developed, identifying the characteristics of students, the needs of educators in learning, and identifying the characteristics of local wisdom of the community and analysis of the suitability of local wisdom with the concept of science in junior high school. This needs analysis was carried out by interviewing the deputy headmaster, science teacher, and junior high school students, and community leaders. In addition, direct observations were also made when the science teacher was teaching. Analysis of the needs of a theoretical study in the form of a 2013 revised 2018 curriculum analysis and theories relating to local wisdom, character, and the development of a good LKPD for aspects of graphic feasibility, content, language, and presentation.

The design phase is carried out in the preparation of LKPD designs based on local wisdom. The activities are as follows: a. Drafting LKPD material on the properties of objects, changes in form, mixture, physical and chemical changes consisting of 1) LKPD title that refers to KD and its equipment, 2) Writing KD, 3) LKPD objectives, 4) LKPD contents are in accordance with local wisdom and learning resources that support LKPD, b. Development of instruments to validate LKPD, c. Compilation of RPP. The development phase is carried out on the development of LKPD based on the results of expert validation. The activities are as follows: a. Development of LKPD b. Instrument preparation, c. Expert validation of products developed through FGD, d. Product revision based on expert input.

The implementation phase conducted a limited LKPD trial by taking one class at grade VII students of Sungai Kakap Middle School as many as 20 people to distribute the response questionnaire. Response questionnaires were also distributed to 10 (ten) Sungai Kakap Middle School teachers, Sungai Rengas. Furthermore, a field test was conducted on grade VII students of Sungai Kakap Middle School as many as 30 people. Field test results are used to perfect the LKPD.

The evaluation phase is carried out by FGD activities to analyze all activities carried out at the implementation stage. The results of the FGD activities at this stage are used to improve LKPD.

RESULT AND DISCUSSION

Result

Through research data collection activities that refer to the ADDIE research stage, starting from the preliminary events to the evaluation, activities, have succeeded in developing as many as 5 LKPD products. LKPD developed as follows: 1) LKPD in the form of substances, 2) LKPD of heat transfer, 3) LKPD changes in the nature of objects, 4) LKPD changes in physics and chemistry, and 5) LKPD in mixed separation. LKPD products are tested for eligibility through validation by experts and response tests by students in limited tests. The results showed that the developed LKPD was suitable for use in learning the material and its characteristics for grade VII students of SMP. Extensive classroom testing of students in fact found that LKPD based on local wisdom used in science learning can improve students' character.

The analysis step was carried out field study activities in the Sungai Kakap District community using observation, interview, survey and documentation techniques. It was found that the local wisdom of the people who lived on peatlands had not been utilized by educators in learning. Educators have not yet developed LKPD themselves. LKPD used was LKPD which is available from the publisher or downloud from the internet. The complete results of the questionnaire given to junior high school science educators in Sungai Kakap, Punggur and Sungai Rengas were 10 (ten) people.

Tabel 3. Preliminary Study Questionnaire for Science Educators

No	Statements	Educator's Responses (%)	
		Yes	No
1	I have not used local wisdom in science learning	80	20
2	I do not know the local wisdom in the Kakap district	80	20
3	I agree if science learning is carried out in an integrated manner with local wisdom	100	0
4	I rarely practice science because of the lack of tools and materials available at school	100	0
5	I have never made a LKPD myself	100	0

In accordance with the research objective to develop LKPD based on local wisdom of substances and their characteristics, the preliminary data collection were not only carried out on the life of the farming community but also data collection was also carried out in schools (teachers and students). This activity was carried out by the main research team consisted of two lecturers and co-researchers, consisted of one teacher and four students. The research carried out in May-August 2019.

Observations were made on the habits of the community in their daily life by utilizing peatlands. The results of field observations obtained information that, in addition to planting rice, farmers also use their land by growing cassava, taro, bananas, corn, soybeans, small reeds, and coconuts. Most of these are processed into food for their own needs and sold. Some of them were used for medicines. There are objects around the environment that are used to make simple water purification.

Furthermore, validation was carried out by experts to check the suitability of local wisdom with Basic Competence, science concepts and character values. A total of 8 (eight) science teachers validated, an average score of 3.96 was obtained with a very good category.

Tabel 4. Local Wisdom, Character, Science Concepts, and Learning Resources for Substance Materials and Classifications

No	Observation Results of Local Wisdom-Based Community Activities in Sungai Kakap District	Character	Science Concepts	Learning Source
1.	Collecting water spots on reed leaves in the morning to remove internal heat	Curious, Care for the environment	Drops of water on reed leaves in the morning are examples of condensation	Form of Substance and Heat Transfer LKPD
2.	Cook water using a pan placed on a fire using wood branches from various plants on peatlands	Environmental care	Steam appears when the lid is opened, an example of an evaporation	
3	Treating the juice of water through heating, then put in bamboo molds and cooled down will become hard brown sugar. Activities carried out together with family members and surrounding residents.	Curious, cooperation, responsibility	Changing the juice of palm sugar into solid sugar is an example of frozen Palm juice is heated to become brown sugar	
4.	Family members and local residents processed traditional copra. Drying is done using sunlight with a drying floor or shelves made of bamboo.	Curiosity, cooperation, responsibility	Changing properties of objects due to heating	Changing the Nature of things LKPD
5.	Cultivating the remnants of dried leaves from various plants grown on peatlands into compost. Activities carried out together with the surrounding community.	Curiosity, cooperation, environmental care attitude and responsibility	Changes in the nature of objects due to decay	
6.	Processing rice from the fields into flour and then making nagasari cake together with family members traditionally for sale: a. Pounding rice into flour b. Grate the coconut	Cooperation, care for the environment and responsibility	The change from rice to flour is an example of a change in physics Changing round coconut into coconut shavings granules for example of physical changes	Changes in Physics and Chemistry LKPD
7.	Processing cassava that is planted in the yard of the house becomes tapai together with family members for sale.		Changes in cassava into the results of processing examples of chemical changes	
8.	Purifying peat water during the dry season for daily needs together with family members and surrounding residents traditionally by utilizing sand, coconut charcoal, and stones from the surrounding environment	Curious, cooperation, responsibility, care for the environment	The process of purifying peat water into clean water	Mixed Separation LKPD

Tabel 5. Validation of BC Conformity with Local Wisdom, Science Concepts, and Character

Assessed Aspects	Validator Score								Average	Category
	1	2	3	4	5	6	7	8		
KD compatibility with community activities based on Local Wisdom	4	4	4	4	4	4	4	4	4,00	Very Good
Conformity of local wisdom with Substance Material and Classification	4	4	4	4	4	4	4	4	4,00	Very Good
The suitability of community activities based on local wisdom with character values	4	4	4	4	3	4	4	4	3,88	Very Good
								Total	11,88	
								Average Score	3,96	Very Good

LKPD was resulted from the analysis of Basic Competence and Science Materials in SMP, which 5 (five) LKPD validated by experts, namely 12 (twelve) natural science teachers and 3 (three) lecturers. Validation was done in FGD (Focus Group Discussion) activities. Validation used LKPD validation instruments consisting of 10 (ten) items.

Tabel 6. LKPD Validation

Validator	LKPD 1		LKPD 2		LKPD 3		LKPD 4		LKPD 5	
	Score	Average	Score	Average	Score	Average	Score	Average	Score	Average
Validator 1	37	3,70	36	3,60	36	3,60	36	3,60	35	3,50
Validator 2	35	3,50	36	3,60	38	3,80	37	3,70	36	3,60
Validator 3	36	3,60	38	3,80	35	3,50	37	3,70	35	3,50
Validator 4	36	3,60	35	3,50	34	3,40	36	3,60	36	3,60
Validator 5	37	3,70	34	3,40	36	3,60	35	3,50	36	3,60
Validator 6	35	3,50	36	3,60	35	3,50	36	3,60	37	3,70
Validator 7	38	3,80	36	3,60	37	3,70	37	3,70	36	3,60
Validator 8	36	3,60	34	3,40	36	3,60	35	3,50	35	3,50
Validator 9	37	3,70	35	3,50	36	3,60	37	3,70	36	3,60
Validator 10	37	3,70	37	3,70	35	3,50	38	3,80	36	3,60
Validator 11	35	3,50	34	3,50	36	3,60	37	3,70	35	3,50
Validator 12	38	3,80	36	3,60	37	3,70	36	3,60	36	3,60
Validator 13	35	3,50	35	3,50	37	3,70	38	3,80	36	3,60
Validator 14	36	3,60	36	3,60	38	3,80	37	3,70	37	3,70
Validator 15	36	3,60	37	3,70	35	3,50	37	3,70	36	3,60
Average Score (Sr)	3,63		3,57		3,61		3,66		3,59	
Criteria	Very Good		Very Good		Very Good		Very Good		Very Good	

The validation analysis results obtained an average score of each LKPD of> 3.40 with a very good category.

The validator also gave descriptive advice on LKPD, namely: 1) the procedure or steps of the activity were added with pictures to make it easier for students to practice it appropriately, 2) LKPD cover was added with pictures of community activities based on local wisdom, not just plants. Input from the validator is used by researchers to improve LKPD.

Validated LKPD were duplicated for use in limited trial activities. Limited group trial activities were carried out for 20 students in SMP in Kakap District. The questionnaires were distributed to students to ask their responses about LKPD. Average score of practicality tests obtained by 88.61% with very good criteria.

Thus, LKPD can provide convenience in learning and were liked by students.

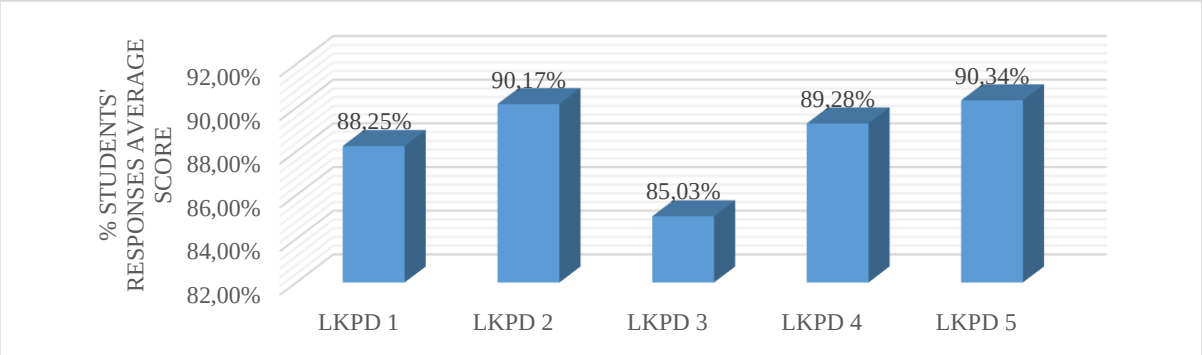

Figure 2. LKPD Practicality Test in Limited Groups through Response Questionnaire

The next implementation activity is the actual class test by involving students in a larger number than the limited trial of 30 people. In this activity, the response questionnaires were administered before and after learning using LKPD based on local wisdom.

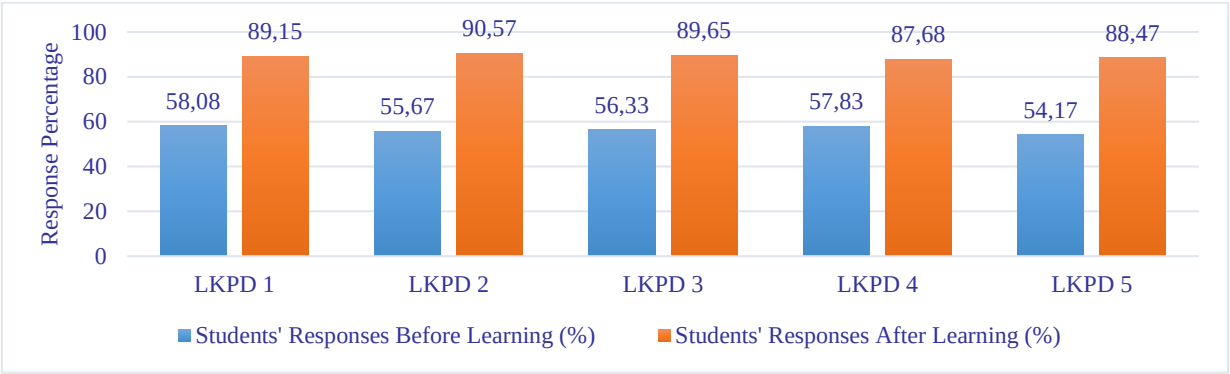

Figure 3. Student Response Field Test Activities

There is a change in students' responses. Before learning to use LKPD based on local wisdom, the response of students in the good category, but after learning the response was very good for students. In the field test activities, self-assessment questionnaires about character were distributed, both before learning and after learning, the results of which are as follows.

Table 7. Results of Self-Assessment Questionnaire about Character in Field Test

	Cooperation		**Curiosity**		**Responsibility**		**Environmental Care Attitude**	
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
LKPD 1	1,89	3,60	1,92	3,55	1,68	3,51	1,76	3,49
LKPD 2	1,80	3,51	1,90	3,50	1,50	3,52	1,65	3,69
LKPD 3	1,82	3,60	1,86	3,61	1,61	3,62	1,72	3,51
LKPD 4	1,78	3,78	1,89	3,59	1,65	3,57	1,60	3,78
LKPD 5	1,75	3,60	2,01	3,52	1,52	3,54	1,73	3,80
Rata-rata	1,81	3,62	1,92	3,55	1,59	3,55	1,69	3,65
Criteria	Poor	Very Good	Poor	Very Good	Poor	Very Good	Poor	Very Good

Discussion

The results of this study in the form of LKPD based on local wisdom of substance substances and their characteristics are feasible to use because the validation results show that the product is very good. Learning tools that are in accordance with the theory of development are right on target or valid, meaning that the product if used can measure the ability expected (Akbar, 2013). LKPD is part of the learning tool and is used as a learning resource. Thus the LKPD developed is in accordance with the theoretical foundation of development, so that it is feasible to be used by educators and students in learning.

The development of LKPD is based on the results of the IPA concept and character values found in the local wisdom of the people who live in the Kubu Raya peatland which has been carried on for generations. The local wisdom of the people studied is related to the substance and its characteristics, namely: community activities in finding medicine to remove heat, boil water, process palm water into brown sugar, process copra, process the remaining leaves / vegetables into compost, process rice into various food, making tapai, and purifying peat water in the dry season. In addition, character values that stand out from everyday community activities can also be found that can be developed in science learning. In line with the statement of Toharudin and Kurniawan (2017) that in local wisdom there are potential values developed in education. One way to create an effective and conducive learning environment is to link science learning with local wisdom (Azizahwati ,2015).

Integrating local wisdom in learning science is important to be done by educators. Teaching science cannot be separated from the environment and people's lives (Ankiewicz, De Swardt and De Vries, 2006). The environment can be an interesting learning source and encourage students to learn (van der Meij, van der Meij and Harmsen, 2015). The ease of receiving and understanding subject matter through the application of local culture was also found in the research of Yustinaningrum (2019). Educators need to package learning by incorporating local wisdom in the learning tool, for example developing LKPD material manifestations and heat transfer based on local wisdom. Local culture that can be integrated, for example, the process of processing the juice of water by the community traditionally discussed in the material form of matter and heat transfer. Through this local wisdom-based LKPD, it is hoped that it can help students in understanding information about local knowledge in the form of methods for processing palm juice into solid brown sugar that has been carried down from generation to generation by the people in Kakap sub-district, Kubu Raya Regency, becoming scientific knowledge. So local knowledge is important for students to know. Local knowledge sourced from local wisdom should be introduced back into learning (Surya, 2011).

The results of the research in the pilot phase in the classroom actually showed that there was an increase in students' responses after learning science using the local wisdom based LKPD. The average response of students before learning by 56, 42 with a good category, after learning to be 89.10 with a very good category. LKPD based on local wisdom was also responded well by students because it provided convenience and was interesting. Sari's research result (2018) showed that the LKS science based on local wisdom of coffee on the subject of business and energy is very practical for students. Very good response from students to learning because LKPD based on local wisdom is developed from community activities in their homes. LKPD contains pictures about events or behaviors that often occur and are seen by students. Learners find it easy to learn science material. Learners become aware that the concept of science has something to do with people's lives. Children will more easily understand what is learned if using information or materials that are often utilized in everyday life (Schönborn and Bögeholz, 2009).

Local wisdom is very important because it is related to character (Wagiran, 2012). The results of LPD trials based on local wisdom in the classroom actually show that there is an increase in the character of students in the attitude of cooperation, curiosity, responsibility and care for the environment. The character of students becomes better after learning is used using materials derived from local elements (Khusniati, 2014; Mannan and Sopyan, 2015). The formation of children's characters can be done by integrating learning resources into learning (Almerico, 2014). Teaching material is the right media to integrate character education (Saleh and Sultan, 2015). The character of care and responsibility can be improved using teaching materials based on local wisdom (Lestariningsih and Suardiman, 2017).

CONCLUSION AND SUGGESTION

The results of the study concluded: 1) LKPD based on local wisdom included in the category of very good, making it feasible to be used in science learning, 2) Practicality test results showed that LKPD based on local wisdom was included in the practical category, and 3) LKPD based on local wisdom was effective in developing the character of participants students.

The development of learning tools based on local wisdom from the results of this study is expected to be followed up by educators to be used in learning. In addition, it is hoped that subsequent studies can follow up on the results of this study through dissemination in several different schools and conduct empirical tests on the successful implementation of learning tools.

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